

# Lassen Community College Course Outline

## WT-32 Advanced GTAW for Gunsmiths

3.0 Units

### I. Catalog Description

This course is designed to provide an opportunity for the student to further their understanding in applying the specialized gas tungsten arc welding (GTAW) process to aluminum and stainless steel as it relates to firearm repair. Students will work on the design, function and repair of gunparts and related equipment using the GTAW process. The student will be required to provide their own tungsten welding electrodes for this course at a cost of approximately \$30.00. Must be accepted into the gunsmithing program prior to enrollment. This course has been approved for hybrid delivery.

Prerequisite(s): None

Corequisite(s): None

Recommended Preparation: WT 31 GTAW for Gunsmiths

Transfers to CSU only

17 Hours Lecture, 102 Hours Lab, 34 Hours Outside Class, 153 Total Student Learning Hours

Scheduled: Spring

### II. Coding Information

Repeatability: Not Repeatable, Take 1 Time

Grading Option: Graded or Credit/No Credit

Credit Type: Credit - Degree Applicable

TOP Code: 095650

### III. Course Objectives

#### A. Course Student Learning Outcomes

1. Students will complete seven of the weld joint designs using the Gas Tungsten Arc Welding process (GTAW) on stainless steel.
2. Students will complete ten of the weld joint designs using the Gas Tungsten Arc Welding process (GTAW) on aluminum.

#### B. Course Objectives

Upon completion of this course the student will be able to:

1. Demonstrate safe handling and use of the gas tungsten arc welding (GTAW) equipment when applied to gunparts, related equipment and projects.
2. Demonstrate the manipulative skills necessary to weld selected joint designs with the gas tungsten arc welding (GTAW) process which meet industry standards.
3. Identify the base material type(s) for applying the gas tungsten arc welding process to gunparts, related equipment and projects.
4. Select the appropriate tungsten electrode type and diameter for application to gunparts, related equipment and projects.
5. Select and apply the appropriate heat range, high frequency, polarity, shielding gas flow rate, filler rod type and diameter to gun parts, related equipment and projects.
6. Demonstrate appropriate methods for preparing base metal materials.

7. Demonstrate correct use of fixturing devices, heat fences, tacking and welding procedures to gun parts, related equipment, and projects.
8. Demonstrate the manipulative skills necessary to perform silver solder on selected joint designs.

#### **IV. Course Content**

- A. Safety Precautions
  1. Electrical shock
  2. Radiation hazards
  3. Compressed gases
  4. Air contamination
  5. Emergency shop procedures
- B. Base Metal Identification
  1. Low, medium and high carbon steel
  2. Stainless steels
  3. Aluminum
  4. Aluminum magnesium alloys
  5. Brass
  6. Cast steels vs. cast irons
- C. Tungsten Electrodes - Types and Diameter Selection
  1. 2% thoriated - red coded
  2. 1% thoriated - yellow coded
  3. Pure - green coded
  4. Zirconiated - brown coded
  5. Diameters
- D. Filler Rod Selection
  1. Low, medium and high carbon steel
  2. Stainless steels
  3. Aluminum
  4. Aluminum magnesium alloys
  5. Silicon bronze
- E. Base Metal Preparation Techniques
  1. Mechanical
  2. Chemical
- F. Fixturing Devices
  1. "Helping hands"
  2. Magnets
  3. Vise and vise grips
  4. Aluminum and copper plate
- G. Heat Fences
  1. Heat stop
  2. Chill plates
  3. Sand and water quench
- H. Selected Joint Designs - Stainless Steel
  1. Flat - no filler
  2. Flat - filler
  3. Closed butt - flat and vertical
  4. T-joint - horizontal
  5. T-joint - vertical

6. Corner joint (Outside)
7. Edge joints - single and double
- I. Selected Joint Designs - Aluminum
  1. Flat - no filler
  2. Flat - filler
  3. Closed butt - flat and vertical
  4. T-joint - horizontal
  5. T-joint - vertical
  6. Corner joint (Outside)
  7. Edge joints - single and double
- J. GTAW Projects
  1. .45 barrel hoods
  2. Screw heads
- K. Silver Soldering
  1. Types of solder
  2. Soldering devices
  3. Soldering techniques
  4. Lap joint bend test
  5. Silver solder project

## V. Assignments

### A. Appropriate readings

College Text: "Welding Principles & Applications," and/or trade manuals will be primary reference sources for course readings. Additional information sources will include product and use guides from industry manufacturers to enhance the learning process.

### B. Writing assignments or skills demonstration

Students will apply technical skills and understanding of course content by demonstrating application of the gas tungsten arc welding (GTAW) process on selected gun parts and projects which meet industry and shop standards.

### C. Out of class assignments

May include:

1. Pertinent supplementary literature
2. Design and fabrication of gunsmithing equipment using the gas tungsten arc welding process using the gas tungsten arc welding (GTAW) process.

### D. Assignments that demonstrate critical thinking

Students will be required to demonstrate understanding of gas tungsten arc welding (GTAW) concepts and practices by applying the technical information to a required number of gunparts, related equipment and projects. Performance levels will meet or exceed industry and/or shop specifications.

## VI. Methods of Evaluation

### Traditional Classroom Evaluation

Methods for determining student grades will be accomplished by the following:

- A. Completion of required number of gunparts, related equipment and projects
- B. Participation in classroom learning activities

### Hybrid Evaluation

Students will be expected to complete all quizzes, exams, online assignments and activities equivalent to in class assignments and activities for the online portion of the

course. Electronic communication, both synchronous and asynchronous (chat/forum) will be evaluated for participation and to maintain effective communication between instructor and students.

## VII. Methods of Delivery

Check those delivery methods for which, this course has been separately approved by the Curriculum/Academic Standards Committee.

Traditional Classroom Delivery  Correspondence Delivery

Hybrid Delivery  Online Delivery

### Traditional Classroom Delivery

Demonstration/Laboratory

### Hybrid Delivery

A combination of traditional classroom and online instruction will be utilized. Each semester a minimum of 102 hours will be taught face-to face by the instructor and the remaining hours will be instructed online through the technology platform adopted by the District. Traditional class instruction will consist of exercises/assignments, lectures, visual aids, and practice exercises. Online delivery will consist of exercises/assignments, lecture posts, discussions, adding extra resources and other media sources as appropriate.

## VIII. Representative Texts and Supplies

Jeffus, Larry; *Welding Principles & Applications*, 2017, 8<sup>th</sup> Edition, Delmar Cengage Learning, ISBN: 978-1-305-494695-5

### Supplies: (Required)

- A. Gauntlet leather welding gloves
- B. Safety glasses
- C. Leather "logging type" boots
- D. Cuffless, heavy cotton workpants, in good repair
- E. 2% Thoriated tungsten electrodes (red)
- F. Pure tungsten (green)

## IX. Discipline/s Assignment

Welding Technology

## X. Course Status

Current Status: Active

Original Approval Date: 2/27/1990

Revised By: Kory Konkol

Latest Curriculum/Academic Standards Committee Revision Date 02/15/2022